



# ePaper Creates New Opportunities for Digital Displays

The technology behind eReader devices is opening the door for new and innovative signage.

By Richard Slawsky | Contributing writer, Digital Signage Today

DEVELOPED AND PUBLISHED BY:



SPONSORED BY:



# ePaper Creates New Opportunities for Digital Displays

The technology behind eReader devices is opening the door for new and innovative signage.

By Richard Slawsky | Contributing writer, Digital Signage Today

SPONSORED BY:



It seems as if digital displays are increasingly becoming a part of our everyday lives, from bus stop signage that shows the expected arrival time of the afternoon express to wayfinding kiosks that direct us to where we need to go, and much more.

And it's all with good reason. Displays that can be updated in real time, helping us to be more efficient in our daily routines. They save on the printing, mailing and deployment costs associated with printed signage, and they've been demonstrated time and again to increase recall and retention of the content they provide.

But as those displays become increasingly prevalent, they bring with them a number of challenges. Chief among them is the power needed to drive the technology. Not only do digital displays come with increased energy costs, but their use is limited by the availability of that power. Those issues can limit the deployment of digital technology and rob communities and businesses of the convenience they provide.

On the other hand, those challenges are creating opportunities for the application of tried-and-true technologies that overcome many of the hurdles associated with standard digital displays.



Joan Board with 13.3" E Ink  
Photo courtesy of Visionect

## The look of paper

The issue of power consumption for developing technology isn't new. The skyrocketing energy usage associated with the widespread adoption of refrigerators, air conditioners and other home systems prompted the development of Energy Star standards that are today recognized as a symbol of superior energy efficiency.

It's the same with digital displays, with the increased energy usage prompted by the technology already creating concern around the United States. In 2015, for example, the California Energy Commission proposed a controversial set of mandates proposing to limit the power consumption of computer monitors and digital displays. It's a safe bet that both municipalities and businesses will put the energy costs of those displays at the top of the list of factors to consider when using digital signage to supplement their operations.

One solution to the issue of digital display energy costs is the electronic paper display technology commercialized by Billerica, Mass.-based E Ink Corp. (pronounced ē ing k). Variations of the technology are used in eReader devices such as Amazon's Kindle and Barnes & Noble's Nook. It goes by a number of names, including ePaper, electronic ink and electrophoretic ink.

Although the technology behind ePaper is complicated, simply put, it mimics the appearance of ink on paper.

At the core of E Ink's technology are small capsules filled with a clear fluid containing tiny particles, each about as wide as a human hair, sandwiched between a layer of electrodes. When a positive or negative electric field is applied to an individual electrode, the particles with the corresponding charge will move either to the top or bottom of a capsule, making

the surface of the ePaper display appear a certain color. In its most basic form, the particles inside the capsule will be either black or white. The white particles carry a positive charge and the black particles a negative one. If the electric charge applied is negative, the black particles will be repelled to the top of the capsule and color the surface of the display black in that spot. Vice-versa for the white particles. These particles do not require power to stay in their position; they can maintain their position indefinitely until a new charge is applied, meaning that E Ink's technology is extremely power efficient.

Today, ePaper is being used for applications including transportation signage, conference room displays, wayfinding and more. Its use is becoming increasingly prevalent in so-called "Smart City" deployments centered around streetside displays and "Smart Office" applications such as huddle room whiteboards and meeting room booking applications.

## Driving new applications

The concept behind ePaper technology may be fascinating, but its real value lies in certain aspects of the process.

One, creating a static image on an ePaper display requires only a minimal amount of energy. Two, the display will hold a static image indefinitely, even without electricity.

What that means for displays using ePaper is that energy requirements are extremely low, significantly lower than an LED or LCD display. As such, an ePaper screen can run for weeks on a single battery charge or via electricity provided by a small solar panel, independent from the electric grid. In addition, the fact that ePaper displays can be deployed without connecting to the electrical grid can dramatically reduce installation costs. Transit agency Port Authority of Allegheny County and Connectpoint® address this successfully, see case study at the end.



Connectpoint's solar-powered Digital Bus Stop®  
Photo courtesy of Connectpoint

Because the displays use reflected light rather than creating their own light, they don't contribute to light pollution. Although that may seem to be a minor point, the light from traditional digital signage can attract insects, interfere with bird migration and even disrupt a person's circadian rhythm, or internal clock. The displays are easier on the eyes and offer a wider viewing angle than most other displays. Content displayed on ePaper remains perfectly visible even in direct sunlight.

And as with traditional signage, a portion of an ePaper display can be used for local advertising, potentially creating a revenue stream that can offset installation and operating costs.



The technology behind ePaper, for example, is being used to communicate bus arrivals and city information via 42-inch displays in Las Vegas as part of a six-month pilot being conducted under a partnership between the city and Cambridge, Mass.-based Soofa Signs. The displays align perfectly with the city's goal of receiving 100 percent of the energy it needs from renewable sources.

The city will also be able to offer ad space on the signs. Soofa has developed a proprietary content management system focusing on finding local businesses to advertise. The signs are initially being placed along Las Vegas' Downtown Loop, but the company is expanding its network of signs around Las Vegas as well as across the United States later this year.

And Slovenia-US based Visionect has introduced Joan, a meeting room booking system for "Smart Offices" based on ePaper technology. The sleek displays can be placed on a door or wall next to a meeting room to show if the room is booked or not. Joan works with MS Outlook, 365, Google calendar, iCal and other most widely used calendars. Meetings can be booked directly from the device, from the company's calendar or by using Joan app on mobile phones.

The displays come with magnetic mount, meaning they literally stick to the wall. Wifi enabled Joan devices are setup in just few minutes, no drilling, no wiring needed.



Soofa sign in downtown Las Vegas with 42" E Ink display  
Photo courtesy of Soofa

When used daily, the batteries for the 6-inch touchscreen devices usually last for up to 3 months. The 13-inch Joans can stay operational for up to 12 months on a single charge, sending an email to administrators when batteries run low.

Joan is highly customizable as she works in 20 languages, users can replace Joan's logo with their own, and can display custom text and pictures like welcome messages, company achievements or even birthday wishes.

## **Growth for the foreseeable future**

The benefits offered by ePaper displays are expected to drive the growth of the technology for the foreseeable future. In fact, a recent study compiled by Research N Reports projects the ePaper market will grow at a compound annual rate of 36 percent over the next five years.

Another report, by Zion Market Research, predicts the ePaper market will top \$28.87 billion by 2022, up from \$6.75 billion in 2016. That's a compound annual growth rate of slightly more than 27.4 percent over the period.

Applications for ePaper technology extend far beyond transportation and wayfinding signage. Other uses include watches, shelf tags, ID badges, service station signs, traffic condition displays and more.

And the color and resolution capabilities of ePaper displays continue to expand. E Ink is developing a new type of ePaper called ACeP, or Advanced Color ePaper, that can display more than 32,000 different colors at a resolution of 1600 x 2500 pixels and 150 PPI.

With the continuing development of new technologies such as IoT and others, ePaper displays are likely to spawn new and as-yet undreamt-of applications for consumer-facing screens. Not only will that lift up the entire digital signage sector, those new applications will make our lives easier in the process.

## **Connectpoint® teams with E Ink to deliver smart transit, digital signage.**

### **The challenge**

The transit agency Port Authority of Allegheny County, the second largest transit agency in Pennsylvania, wanted to install real-time, digital bus stops in the downtown Pittsburgh area. Unfortunately, they didn't have electrical infrastructure to support these digital displays so they turned to their wayfinding solutions partner Connectpoint®.

Connectpoint had recently developed the first solar-powered, real-time, ePaper digital displays in North America aptly named Connectpoint® Digital Bus Stop®. Connectpoint also developed a lightweight, weatherized casing that can be deployed on existing infrastructure within 30 minutes.

Implementing solar-powered, digital signage in an urban environment is a challenge with shade considerations such as different heights of buildings and trees, to name a few. Also, in direct sunlight LED/LCD screens are hard to read so ePaper was the perfect solution. When broadcasting real-time arrivals, maps and alerts ePaper displays are perfect for outdoor environments because of its high visibility in any lighting situation.

### **The results**

The Port Authority of Allegheny County, with a daily ridership of over 85 million a year, contracted a total of 20 solar-powered, real-time, ePaper Connectpoint® Digital Bus Stop® products to be installed. This was the largest real-time, ePaper variable messaging deployment in North America.

Broadcasting real-time arrival/departure times to riders resulted in lessening their confusion and creating a more enjoyable transportation experience. Studies show that when riders have the information available, even if there is a delay, it puts them more at ease and able to feel in control of their trip.

While installing at busy intersections, riders of all ages were intrigued and incredulous. They couldn't believe that they could see in real-time when their bus would arrive. There were smiles all around on the inaugural launch, and Port Authority of Allegheny stated that people not only use the Connectpoint® Digital Bus Stop® with real-time arrivals/departures/alerts but study it.

*Source: Connectpoint*

### **About the sponsor:**

*E Ink is the originator, pioneer and commercial leader in ePaper technology. The company delivers its advanced display products to the world's most influential brands and manufacturers, enabling them to install extremely durable, low power displays in previously impossible or unimaginable applications and environments.*

*E Ink encompasses the combined E Ink Corporation, which was spun out of the MIT Media Lab in 1997 to commercialize electronic ink and EPD technology, and Prime View International, which was established in 1992 as the first TFT LCD company in Taiwan, focusing on high quality small-to-medium-sized TFT LCDs. In 2009, Prime View acquired E Ink Corporation to further integrate and expand the EPD supply chain and the new combined companies were branded as E Ink.*

*E Ink's corporate philosophy centers around delivering revolutionary products, excellent user experiences, and environmental benefits through advanced technology development.*